

Application No. 09/411,212

AMENDMENTS TO THE SPECIFICATION:

Please substitute the following amended paragraphs for the pending paragraphs beginning on page 1, lines 12 through 23:

"METHOD AND APPARATUS FOR IDENTIFYING A PLURALITY OF SUB-IMAGES IN AN INPUT IMAGE," Dennis L. Venable et al., Application No. 08/786,538, filed January 21st, 1997;

"STRUCTURED IMAGE (SI) EDITOR AND METHOD FOR EDITING STRUCTURED IMAGES," Michael R. Campanelli et al., ~~Application No. 08/338,856, filed November 14, 1994~~ U.S. Patent 5,666,503; and

"LOCATING THE POSITION AND ORIENTATION OF MULTIPLE OBJECTS WITH A SMART PLATEN," Dennis L. Venable., ~~Application No. 08/785,109, filed January 21st, 1997~~ U.S. Patent 6,738,154.

"AUTOMATIC IMAGE SEGMENTATION IN THE PRESENCE OF SEVERE BACKGROUND BLEEDING," Dennis L. Venable, ~~Application No. D/09423, filed _____, 1999~~ U.S. Patent 6,704,456.

Please substitute the following amended paragraph for the pending paragraph beginning on page 10, line 1:

Also part of system 20 is a color image output device such as printer 34 which may include a laser-driven, xerographic printing engine as found in a number of commercially available printers. In a preferred embodiment, system 20 is employed to process the digital image data received as input from a scanner 26, utilizing image processing software running in processor 50, so as to produce an output file that may be rendered by printer 34, stored in memory 50, and/or transmitted to another device via network 40. Although system 20 is depicted as an integrated unit in Figure 1, it will be appreciated that the system may also comprise a plurality of independent yet interconnected units. Referring

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to Figure 3, it will be appreciated that the document placed upon the scanner platen in system 20 may not be accurately registered along the registration edges 25. For example, a particular embodiment to which the following description will be directed is a single document ~~object O~~ object 24 placed in a central location on the platen of scanner 26 as illustrated in Figure 3. In accordance with the present invention it is desired to automatically identify the position, shape and rotation angle of ~~object O~~ object 24. In a facsimile transmission system using a set of rollers to advance a document through a scanning nip, it will be appreciated that the document may become skewed during the digitization process and that the present application may have particular application to such systems as well.

Please substitute the following amended paragraph for the pending paragraph beginning on page 11, line 15:

As depicted by the flowcharts of ~~Figures 5 and 6~~ Figures 5 and 6, the object location step 100 is performed by first identifying the background region of the input image 102, characterizing the background region 104, and then using the characteristic of the background region as a seed, identifying all the pixels representing the background region with an adaptive seed fill algorithm 106. Background pixels are pixels not associated with any objects, or more simply, they are pixels representative of those regions lying outside of the objects, the values of which are controlled by the "background" against which the objects are placed during scanning (e.g., the underside of the platen cover). One embodiment employs the average color of a small region in the upper left-hand corner of the scanned image as an initial estimate of the background color. Alternatively, other sampling operations may be employed to determine the background color as described, for example, in ~~US A-5, 282,094~~ US-A-

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5,282,091 for a Programmable Apparatus for Determining Document Background Level by Farrell.

Please substitute the following amended paragraph for the pending paragraph beginning on page 15, line 1:

After the data reduction, at step 420 of ~~Figure 6~~ Figure 7, an estimation of the angle of the line passing through each remaining point on the contour is preformed. As shown in Figure 7, a modified linear regression in a particular window (W) centered on each point is performed so as to estimate an angle of the line passing through each remaining point of the contour determined by the set of data points. Initially a modified linear regression is done on a small window centered on a point (A) where each linear regression requires a series of additions, multiplication's, and arc tangent calculations.

Please substitute the following amended paragraph for the pending paragraph beginning on page 16, line 12:

Once the bin categorization is completed ~~and the each~~ and each point is assigned with the appropriate bin some of the bins ~~contain~~ categorized contain to few data points. Therefore at step 440 of figure 7 it is necessary to remove the bins which contain few or less than a minimum number of data points. Typically this removal is performed when there are approximately 5 data points. As an example of this removal in Figure 10, the smaller bins A, B, and C are removed because they contain less than 5 data points.

Please substitute the following amended paragraph for the pending paragraph beginning on page 16, line 24:

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Next, the remaining bins that share common angles are combined at step 460. These remaining bins were previously not adjacent to each other but became adjacent at step 440 by the removal of small bins found in between the non-adjacent bins. When these bins in between are removed, the bins that are left and that are now adjacent can sometimes be collinear. Therefore, the angle of each bin is checked and if adjacent bins are collinear, the bins are joined into a single bin at step 460. Such a procedure is illustrated in Figure 11, ~~were a bin where a bin~~ defined by AL-AR and another bin defined by BL-BR are compared to each other. The midpoint between each point AM/BM is calculated and the slope of the segment AB is determined and compared to the slopes of each of the bins. If the slopes are within 10° , an amount designated as E, then the following calculation is performed.

Please substitute the following amended paragraph for the pending paragraph beginning on page 17, line 22:

At this stage of the procedure the edge boundary has been reduced to a small number of bins. The next step is to apply a recognition algorithm because the final number of bins usually is 4 for rectangular images. However, there are cases when there are more than 4 rectangular images and so it is necessary to apply a recognition algorithm. This results because smart platens sometimes have regions that ~~are always~~ are not always easily distinguished from the background images and the boundaries of the detected images bleed into the background images. Because of the bleeding, the detected boundaries do not match the actual images in certain locations. Therefore, the boundaries fail to fit the actual image and it is necessary to apply further procedures to make the boundaries fit particular images.

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Please substitute the following amended paragraph for the pending paragraph beginning on page 21, line 14:

Overlap + ~~= Maximum~~ Maximum (P1_{xmin}, P2_{xmin}) - Minimum (P1_{xmax}, P2_{xmax}) + 1 (step 870)